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(54) POWDER COATING INSTALLATIONS

(71) We, SOCIETE ANONYME DE MACHINES ELECTROSTATIQUES, a French Body Corporate of 21, rue Jean Mace, 38—Grenoble, France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is performed to be particularly described in and by the following statement:—

The present invention relates to installations for coating objects with powder, such as a powdered plastics material, in which the powder is drawn off from a fluidisation tank and fed to projection nozzles, and more particularly to coating installations comprising a coating chamber connected to a suction device and provided with projection nozzles in said chamber.

An object of the present invention is to provide, in an installation for depositing a coating of powder on objects, a means for dosing the powder, fluidised in a current of air, which is regulatable so that the powder supply is at least substantially uniform in density whatever the moment and whatever the output of the aspirating member producing a depression in the chamber where the objects are coated, which depression also serves for recovering the plastics material powder which has not adhered to the objects to be coated.

In powder coating installations, it has been found that variations are produced in the concentration and output of the jet of fluidised powder conveyed to the objects to be coated. These variations are mainly caused by the variations in the level of fluidised powder in the tank and by the differences in depression in the chamber where the objects to be coated are placed, this depression serving to recover the powder which has not adhered to the objects. These variations, which are found in the majority of installations for projecting a jet of fluidised powder on objects, may be eliminated or substantially eliminated with the aid of an installation according to the invention.

According to the invention there is provided a powder coating installation comprising a coating chamber with a projection nozzle operating by Venturi effect, a powder fluidisation tank, and a powder feed device between said tank and nozzle, in which installation the coating chamber is located above the fluidisation tank and the powder feed device comprises a pipe extending substantially vertically from an inlet end in the tank to the nozzle, the said inlet being disposed below a constant level overflow.

Advantageously the said pipe inlet end comprises a draw-off part which terminates in the fluidisation tank and is inclined downwardly from its end in the said tank to a point of connection with the vertical pipe remainder, the said latter comprising a downward extension to atmosphere.

Conveniently the coating chamber is connected at its bottom to an aspirator, and the aspirator is disposed above the fluidisation tank and has a lower opening which opens during periods when said aspirator is stopped.

Preferably at least one suction conduit is provided into the coating chamber, the open end of which may be disposed opposite an object zone which is not to be coated.

With an installation according to the invention the powder flow in the pipe is regulated both by the substantially constant powder pressure in the tank, which is due to the stability of the powder level in the tank, and to the aspiration effect produced by the Venturi nozzle. Both these factors may of course be easily maintained constant and it follows that the powder flow in the pipe may similarly readily be maintained constant.

More specifically the pipe inlet end has an internal diameter or section such that, and the selected height of the overflow of the fluidisation tank is such that, when powder is fed to the tank at greater than a minimum rate characteristic for the installation, a substantially stable powder level is obtained.

In order that the invention may be more clearly understood, reference will now be

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made to the accompanying drawing, the single figure of which shows, by way of example, a schematic view of one embodiment according to the invention.

Referring to the drawing, a powdering installation comprises a chamber 1 with an upper opening 2 and connected at its bottom by a tube 3 to the body 4 of an aspirator 5, one outlet 6 of which is situated some distance above the end of the tube 3 and communicates with the outside atmosphere. Below the outlet 6 is arranged a filter bag 7 and beneath this bag 7 the aspirator body 4 terminates in a valve 8 which closes, when the aspirator 5 operates, a conduit 9 opening into the top of a tank 10. This tank 10 is a fluidisation tank for the powder which is continuously fed in through a spout 11, for example powder mixed with air. For fluidising the powder, the fluidisation tank 10 comprises a porous base 12 which defines a lower distribution chamber 13 which is connected by a pipe 14 to a source of compressed air.

The powder is withdrawn from the tank 10 through a branched tube 15 with three branches 16, 17, 18, branch 16 being constituted by a tube of calibrated diameter rising into the interior of the fluidised bath, whilst branch 17 forms a vertically downward extension, to the open air, of the branch 18 which is connected to a pipe 19 leading to a projection nozzle 20, which will not be described in detail but is of the Venturi type, the projection air for which is supplied through a pipe 21.

A second projection nozzle 22 is supplied in a similar manner and between the nozzle 20 and 22 there is placed an object 26 to be coated (which may, for example, be a rotor or stator of an electromagnetic machine), which is supported by an arm (not shown in the drawing) extending through a side opening 27 in the chamber 1.

Below the object 26, in the chamber 1, there is fixed by side arms (not shown) a tube 28 lying opposite and above the opening of the suction pipe 3 into the chamber 1.

At places where the object 26 must not be coated with powder, there are positioned, at a very short distance from the surface of the object 26, the open ends 30 and 31 of pipes 32 and 33 which are connected by a pipe 34 to the aspirator 5.

The fluidisation tank 10 is provided with an overflow 35, the outer end of which is located above a recovery tank 36. This overflow 35 ensures that the fluidised powder in the tank maintains a constant level N, since the fluidised powder behaves very similarly to a liquid.

The device operates in the following manner: powder continuously arrives in the fluidised bath through the spout 11 in a quantity at least slightly greater than that to be used, so that the fluidised bath is kept at a substantially constant level N, any excess powder being discharged through the overflow 35.

As the draw-off conduit 16 has a calibrated internal diameter, a regulated quantity of powder is evacuated through this draw-off conduit 16 and is conveyed through pipe 19 by the air which enters the tube 17 and which is drawn upwardly by the suction effect, known per se, of the nozzles 20 and 22. The projection nozzles 20 and 22 are thus fed with a regulated supply and the powder coats the object at the desired spots with a desired thickness.

The clouds of powder projected by the nozzles 20 and 22 do not stagnate in the chamber 1, because a depression is produced in the chamber due to the continuous sucking of the aspirator 5. Thus the excess powder in the chamber 1 is carried towards the pipe 3 and the aspirator 5 where the powder is collected against the lower face of the filter bag 7. Similarly, the powder which would tend to move towards the places where coating is not desired, that is to say opposite the open ends 30 and 31 of the pipes 32, 33, is immediately aspirated and evacuated through these pipes, so that no deposit is produced opposite these open ends 30, 31, the shape of which corresponds to that of the parts of the object which it is desired not to coat.

When a coating operation is finished, the admission of air to the nozzles 20 and 22 through pipes 21 is stopped, and the aspirator 5 is also stopped.

The powder collected on the filter 7 falls into the base of the body 4 of the aspirator 5, and, under its weight, the valve 8 opens, thus enabling the powder to return to the tank 10. During stopping, powder flows by gravity in the tube 17 towards a recovery device. If desired a closing valve may also be provided on the conduit 16 or 17 and be subject to control by the air inlet valve in the pipes of the nozzles 20 and 22.

The invention has the important advantage that due to the combination of a draw-off tube of calibrated dimensions and of a fluidisation bath of constant level, the output of powder may be closely controlled, thus enabling reproducible coating operations with a constant and predeterminable thickness of powder deposited to be proceeded with.

The deposition of the powder on the object may, if desired, be assisted by electrostatic means.

WHAT WE CLAIM IS:—

1. Powder coating installation comprising a coating chamber with a projection nozzle operating by Venturi effect, a powder fluidisation tank, and a powder feed device between said tank and nozzle, in which installation the

coating chamber is located above the fluidisation tank and the powder feed device comprises a pipe extending substantially vertically from an inlet end in the tank to the nozzle, the said inlet being disposed below a constant level overflow.

2. Installation according to claim 1 wherein the said pipe inlet end comprises a draw-off part which terminates in the fluidisation tank and is inclined downwardly from its end in the said tank to a point of connection with the vertical pipe remainder, the said latter comprising a downward extension to atmosphere.

3. Installation according to claim 1 or claim 2 wherein the coating chamber is connected at its bottom to an aspirator.

4. Installation according to claim 3 wherein the aspirator is disposed above the fluidisation tank and has a lower opening which opens during periods when said aspirator is stopped.

5. Installation according to any of the preceding claims wherein at least one suction conduit is provided into the coating chamber, the open end of which may be disposed opposite an object zone which is not to be coated.

6. Powder coating installation constructed and adapted to operate substantially as hereinbefore described with reference to the accompanying drawing.

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1236772 COMPLETE SPECIFICATION
1 SHEET. *This drawing is a reproduction of the Original on a reduced scale*